According to the Federal Highway Administration (FHWA), about half of traffic fatalities occur at night, although only about 25 percent of all travel occurs after dark. Although driving while intoxicated or fatigued driving contributes to the high rate of nighttime crashes, nighttime driving is inherently hazardous because of reduced driver visibility.

About the Laboratory
Since 2009, the Texas A&M Transportation Institute (TTI) has provided advanced visibility testing through its one-of-a-kind Visibility Research Laboratory, part of the Institute’s world-class research facilities. The lab is located in TTI’s State Headquarters Building at The Texas A&M University System’s RELLIS Campus. The lab features a 140-foot-long by 15-foot-wide corridor for testing retroreflective materials and coatings, lights and other technologies designed to provide nighttime visibility for highway drivers.

For the last 50 years, TTI researchers have conducted full-scale, closed-course nighttime driving studies at the A&M System’s RELLIS Campus, which is located at a decommissioned U.S. Air Force base. This outdoor facility allows for static and dynamic visibility and human factors research at up to 70 mph. The Visibility Research Laboratory complements this full-scale testing facility.

Using advanced technologies such as high megapixel imaging colorimeters, and light detection and ranging (LIDAR), researchers perform photometric and color measurements of sign sheeting, pavement markings, retroreflective raised pavement markings and other retroreflective devices. The lab is equipped with a four-axis photogoniometer to rotate devices to specific measurement geometries. These instruments also allow photometric characterization of vehicle lighting systems. The labs 140-foot tunnel enables researchers to run human-subject night simulation studies under controlled conditions day or night.

About TTI’s Visibility Research
TTI has a distinguished record of research and service in the areas of advanced traffic control materials and highway safety measures for nighttime travel. From more legible traffic signs, to pavement markings that are visible at night in rainy conditions, TTI’s research results are visible everywhere on our nation’s roadways. TTI’s research in these areas led to a new federal regulation for maintained retroreflectivity levels of traffic signs on all roads open to public travel.

Researchers at TTI also tested the only alternate font approved by the U.S. Department of Transportation (USDOT) for highway signs other than the original font developed more than 50 years ago. Scientists also are researching materials to find brighter and longer-lasting pavement marking materials that can withstand snow plows, studded tires, de-icing chemicals and pavement temperatures that can reach well above 150 degrees.

TTI’s Visibility Lab enables testing of the retroreflective characteristics of signs and markings under standardized and real-world conditions.

VISIBILITY RESEARCH LABORATORY

Representative Sponsor List
3M
AASHTO
ASTM International
Advanced Mobile Asset Collection (AMAC)
American Glass Beads Manufacturers Association
American Traffic Safety Services Association
Avery Dennison
DELTAA
Ennis Traffic Safety Solutions
Evonik Industries
FAA
FHWA
Potters Industries, Inc.
State Departments of Transportation
Trinity Industries, Inc.
USDOT
Testing Opportunities

Private Sector Examples
The Visibility Research Laboratory has been used to measure the visibility of traffic control devices (TCDs), retroreflective and luminescent materials, as well as light sources such as work zone lighting, light-emitting diodes (LEDs) and vehicle headlamps. Human factors studies have been performed in the laboratory to better understand how drivers interpret various TCDs, particularly new and innovative devices such as those enhanced with special visibility coatings or LEDs. Through the capabilities of the laboratory, TTI researchers now have the ability to build and calibrate unique data collection equipment to use in the field to evaluate in-situ nighttime visibility, using measures such as retroreflectivity, illuminance, luminance and glare.

Private-sector sponsors have used the laboratory’s capabilities for a variety of testing, such as measuring the performance of innovative coatings to enhance nighttime visibility and the performance of various retroreflective optics at standard and non-standard measurement geometries. The laboratory also has supported the testing of mobile pavement marking and sign retroreflective technologies. Public-private partnerships have emerged as a result of the testing that has been conducted in the laboratory.

Public Sector Examples
State agencies also use the laboratory in their visibility research efforts. The Texas Department of Transportation has sponsored several research projects, including the study of LED-enhanced TCDs. The Florida Department of Transportation sponsored a project in which researchers measured the effectiveness of steady-burn work-zone channelizer lights. For the Alaska Department of Transportation, researchers built, tested and calibrated specialized data collection equipment to assess the visibility of pavement markings along lit and unlit sections of roadways. Other research conducted in the lab has included an accelerated pavement-marking wear protocol and a new test method for assessing glass beads.

The Federal Highway Administration (FHWA) has used research findings from the laboratory to support new regulations on minimum maintenance levels of retroreflectivity for traffic signs. Federal pavement marking and sign sheeting specifications have been updated with research results produced in the laboratory. Testing results from the laboratory also have been used to support the development of ASTM specifications, as well as AASHTO specifications.

Researchers recently supported the Federal Aviation Administration’s work developing a mobile phone application to assess pavement marking visibility by evaluating pavement markings at a range of airplane geometries.